

Skills Research Initiative

The Labour Market and Skills Implications of Population Aging in Canada: A Synthesis of Key Findings and Policy Implications



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Aussi offert en français sous le titre *Les incidences du vieillissement de la population canadienne sur le marché du travail et les compétences : Synthèse des principaux résultats et de leurs incidences sur les politiques*

The Labour Market and Skills Implications of Population Aging in Canada: A Synthesis of Key Findings and Policy Implications

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April 2008

This document presents Skills Research Initiative (SRI) research and summarizes its findings and implications as discussed at SRI workshops. The report represents the views of the researchers and workshop participants and as such does not necessarily reflect the policies and opinions of Industry Canada, Human Resources and Social Development Canada or the Government of Canada.

Executive Summary

The Canadian population is aging. Population aging will affect Canada's ability to provide the talent and skills needed to build an increasingly innovative and productive knowledge-based economy; and population aging will have a wide range of labour market impacts beyond its effects on skills.

Policy responses to the skills and labour market effects of population aging require knowledge of these effects, but there are important knowledge gaps. To address these gaps, the Skills Research Initiative (SRI) identified "Skills and Labour Market Implications of Population Aging in Canada" as one of its four research themes.

The SRI research projects on this theme are now completed. This synthesis report discusses the knowledge they have generated and its implications for policy.

Questions addressed by SRI research include:

- What is the likely impact of population and workforce aging on levels of human capital investment by youth?
- What role can policy play in ensuring continued high levels of human capital investment by youth?
- Does workforce aging have important implications for productivity growth and for Canada's ability to become an increasingly knowledge-based, innovative economy?
- What barriers are there to continued labour force participation by older workers that could be removed by policy actions?
- What is the likely impact of workforce aging on firms and on their labour market practices? How can policy address unfavourable impacts?

Principal Findings

The principal research findings include:

Scenarios

- In a "base case" scenario, most of the economic impact of population aging occurs after 2021. Between 2021 and 2051, growth in living standards (Gross Domestic Product (GDP) per capita) would be 1% a year, about half the growth rate between 2001 and 2021.

- Doubling productivity growth would lead to growth in living standards of 1.9% a year between 2021 and 2051. Raising men's labour force participation rates to the 1976 levels would yield an annual 1.3% growth of GDP per capita between 2021 and 2051. An increase in the annual flow of immigrants would have very little effect on standards of living.
- Another study finds that increasing the flow of highly skilled immigrants could have a significant impact in raising standards of living, but only if these immigrants have skills that can be easily substituted for those of highly skilled Canadians. However, an increased flow of highly skilled immigrants might result in decreased incentives for the Canadian-born to invest in skills.
- A third study shows that population and workforce aging is likely to increase regional disparities. Tighter labour market supply due to more rapid aging in Eastern Canada and Quebec would lead to slower growth in these regions than elsewhere in Canada. Growing regional disparities due to aging will be amplified by immigration if current location patterns of immigrants persist.

Aging, Skills, Productivity and Innovation

- A review of psychology and economics literature suggests that performance in many physical and mental tasks declines with age, but that verbal abilities and "soft skills" such as leadership are less tied to age. Older workers have a large stock of accumulated knowledge and high job match quality, both of which contribute to high productivity.
- Another study finds that workforce aging may have some impact on firm productivity due to the decreased productivity of older workers with a university degree.
- Two studies indicate that by leading to increased wages, workforce aging will tend to increase skills investment by youth. Over the long term, this will increase productivity and lessen the effects of population aging on living standards.
- This increase in skills investment by youth will only occur if post-secondary education is readily available, according to one of these studies. This study found that the availability of places is a critical determinant of how many youth enrol in university programs.
- A literature review on the effects of an aging workforce on innovative capacity notes that there is a very broad range of skills involved in innovation. Experience is a key element in the commercialization aspects of innovation, so that an older workforce may increase this dimension of innovative capacity. Much remains to be learned about what skills are required for innovation and the relation of these skills to age.

Barriers to Participation and Effects in the Workplace

- A study of the effects of Canada's public retirement income system shows that features of this system may result in significant work disincentives for older workers. The greatest impact is on low-income Guaranteed Income Supplement (GIS) recipients.

- Work disincentives in public retirement systems are much smaller in Canada than in many European countries. Canada's public retirement income systems have some incentives to stop working at age 60 and strong disincentives to working past age 65.
- The provisions of private registered pension plans (RPPs) also contain significant work disincentives to continued work by older workers, and these disincentives often begin at age 60. Another study points out that employers can adjust the provisions of pension plans in order to retain older workers, for example, by providing actuarial adjustments to pension levels for workers who continue to work beyond the usual retirement age. An aging workforce is likely to have a significant impact on workplace practices. Older workers require less supervision and may prefer flexible work arrangements, according to one study. Public programs may discourage flexible work arrangements, however. For example, payroll tax ceilings make it costly for employers to offer short work hours or fewer weeks of work.

Policy Implications and Issues

The principal policy implications and issues raised by these research findings are:

- The results of this research underline the need to maintain or increase productivity growth if living standards are to continue to rise despite population and workforce aging. Further increases in skill levels of Canadian workers can make an important contribution to productivity growth and to increased standards of living.
- The effects of population aging will not be the same in all labour markets. The modelling results indicate that population aging will tend to increase regional disparities within Canada, with the most rapid population aging occurring in the poorer regions. This is likely to lead to increased pressure for interregional transfer payments.
- Population aging is likely to lead to increased scarcity of labour, relative to capital, thus resulting in an increase in wage rates relative to the return on capital. The sectoral and occupational labour markets where wages are likely to increase most rapidly are in the health sector, due to rising demand for health services. Moreover, the demand for health services will increase more rapidly in the poorer regions. These regions may find it increasingly difficult to compete for skilled workers, especially in health.
- Immigration as a possible offset to population aging critically depends on two conditions. First, the immigrants must be highly qualified. Second, highly qualified immigrants must have the skills needed in Canadian labour markets. If immigrants lack language skills or if their skills are not well suited to the requirements of Canadian employers, even highly qualified immigrants may not contribute much to raising Canadian standards of living.
- Increases in skilled immigration may tend to lower the return to skills investment by the Canadian-born, and consequently to decrease the supply of skills available from this group. Also, if current patterns of immigrants' choice of location persist, reliance on skilled immigration may increase regional disparities.
- If individual Canadians – in particular, highly skilled Canadians – worked until later in life, it would have an important effect on standards of living as the population ages.

- Trends in labour force participation of older men have been toward earlier retirement in recent decades, although there has been a reversal in this trend in recent years.
- The strongest work disincentives in the public retirement system are for persons who receive or will receive the GIS. There is not likely to be many skilled workers in this group. Indeed, skilled workers are likely to have significant income from sources other than the public retirement system. Under these circumstances, the disincentives to continued labour force participation due to the public retirement income system are small.
 - Increased flexibility, allowing for part-time or part-year work, might be a useful approach to keeping older skilled workers attached to the labour force. As the cost of labour increases with population aging, employers are likely to adjust their employment practices to retain older workers.
 - There are barriers to increased flexibility that could be addressed by policy initiatives, including mandatory retirement, limitations on receiving pension income and employment income simultaneously from the same employer, and contributory plans that make it more expensive to hire part-time or part-year workers.
 - The composition of the skills available may change due to workforce aging. Research shows that certain physical and cognitive abilities decline with age. Older workers are less likely to acquire new skills, but over their work life they have already accumulated a large stock of skills. Older workers may have relatively more soft skills and relatively less technical skills than younger workers, but both of these types of skills are important for innovation and for productivity growth.
 - With smaller cohorts of youth entering the labour market, relative to the size of the existing workforce, training of the cohorts already in the workforce is likely to become an increasingly important source of skills for the Canadian economy. An important role for governments is to support the development of the most relevant and efficient skills development strategies and training methods for an older workforce. Similarly, there is a role in promoting the adoption of such strategies and methods by institutions and employers.
 - Relatively smaller cohorts of youth entrants will also mean that the level of skill investment by these youth will be an important determinant of the skills available to the Canadian economy. Increases in the levels of real wages due to aging will favour increased skill investment by these youth.
 - The skill levels of new entrants, however, will depend critically on the capacity of the post-secondary educational system. Thus, post-secondary educational policy will play a crucial role in determining to what extent the increased skill levels of new-entry cohorts will compensate for their smaller relative size.

1. Introduction

Population and workforce aging pose significant challenges to Canada's ability to provide the skills needed to build an increasingly innovative and productive economy.

Canada is committed to building a more innovative, more productive, knowledge-based economy. A key part of this commitment is to ensure that the talent and skills required are available. The **Skills Research Initiative** (SRI, see box) is a medium-term policy research program undertaken in response to concerns that the development of Canada's knowledge-based economy and innovative capacity may be hampered by persistent shortages of skilled labour.

Skills Research Initiative (SRI)

The Skills Research Initiative was established in 2003 by a Memorandum of Understanding between Industry Canada, Human Resources Development Canada and the Social Sciences and Humanities Research Council. The SRI sought to:

- Foster policy-relevant research on skills, organized around four themes:
 - Labour market and skills implications of population aging in Canada;
 - International mobility of highly skilled workers;
 - Employer-supported training in Canada;
 - Adjustments in markets for skilled workers in Canada.
- Encourage dialogue between researchers, policy makers, and practitioners through conferences and publications;
- Support the dissemination and application to policy of research on skills, particularly within government, in the academic community and among other stakeholders.

Three policy workshops were held in the National Capital Region in 2006: Labour Market and Skills Implications of Population Aging, International Mobility of Highly Skilled Workers, and Adjustments in Markets for Skilled Workers (which included the theme of Employer-supported Training). Following the workshops, final versions of the synthesis report for each workshop and an SRI overview report were prepared. The synthesis reports present the research results of the theme, and discuss their policy implications. The overview synthesizes the findings of all the themes and presents the broad policy implications including an overall diagnostic.

The SRI has published a Working Paper Series that includes all of the papers presented at the policy workshops and issues roundtables. Abstracts of the working papers are posted at http://www.ic.gc.ca/epic/site/eas-aes.nsf/en/h_ra01877e.html. The papers may be ordered through this site. The synthesis reports and the overview are also posted at this site.

This synthesis report is on the subject of “The Labour Market and Skills Implications of Population Aging in Canada,” one of four SRI research themes. This document summarizes SRI and other research findings related to this theme and draws out their policy implications. A draft of this report was presented and discussed at a policy workshop held in January 2006.

Considerable recent work has been done on the implications of population aging for Canadian living standards and retirement income systems (e.g. Organisation for Economic Co-operation and Development (OECD), 2005; Policy Research Initiative, 2005; Standing Senate Committee on Banking, Trade and Commerce, 2005). Many of the labour market and skills implications of population aging have not been examined, so that the challenges posed for skills and labour market policy have not been fully identified. This paper seeks to make a significant contribution to a better understanding of these issues.

The paper is divided as follows. Section 2 provides a brief overview of population and workforce aging in Canada. Section 3 discusses research related to various scenarios on the impact of population aging. How will labour force, productivity and living standards be affected by population aging? Will the effects be the same across regions, industries or occupations? How effective could different policy options be in offsetting the impact of population aging?

Section 4 considers policy-related barriers to older workers’ participation and firm-level impacts of an aging workforce. What barriers are there to continued labour force participation by older workers that could be removed by policy action? What is the likely impact of workforce aging on firms and on their human resources management practices? How can policy facilitate adjustments and address unfavourable impacts?

Section 5 considers relations between aging, skills and productivity; it also examines the impact of an aging workforce on levels of skills investment. Do younger and older workers have different skills? Does workforce aging have important implications for productivity growth? How will population aging affect the capacity to innovate or to adapt? What will be the impact of population aging on human capital investment by youth?

The sixth and final section indicates possible policy directions based on the research findings, and indicates areas for further research to support policy development.

2. Population Aging in Context

Population and workforce aging will have wide-ranging and important effects on the Canadian economy and labour market.

All of the developed economies are experiencing population and workforce aging as the result of decreased fertility and longer lifespans. Like the United States, Canada experienced high fertility during the post-war baby boom, followed by a low-fertility “baby bust.” As a result, a large part of the working-age population in Canada will reach age 65 years between 2010 and 2030. While Canada’s population is younger than that of many other OECD countries, aging between now and 2030 will be more rapid in Canada than in most of these countries. The proportion of retirees in the population will grow rapidly, relative to the working-age population. This aspect of aging has implications for the fairness of Canada’s public pension system and the sustainability of income security. These issues have been widely debated, in Canada and abroad.

In past decades, rising educational levels among new labour force entrants have been an important source of growth in skills. As a consequence of the baby bust, Canadian-born labour force entry cohorts will be smaller, relative to the size of the workforce. Immigration will become a relatively more important source of entrants to the labour market, although Canadian-born school-leavers will continue to be the largest source of entrants. Labour is likely to become scarcer, relative to capital, leading to rising wages and increased employer perceptions of skill shortages. There also tends to be more skill acquisition among the younger workforce than the older workforce. This implies that the aging of the workforce may reduce growth in skills over the next several decades.

Taken together, these trends will pose a challenge to Canada’s ability to provide the increasingly skilled labour force required if Canada is to become a leading innovative economy and to improve its productivity performance. A reduction in the labour force growth may affect living standards, unless employment of older workers increases or productivity growth rises.

An older labour force also implies an increased level of retirement. Firms or industries with a higher concentration of older workers may face substantial replacement costs. It also means that a greater share of turnover will involve older workers (Kuhn, SRI-2003), who tend to be less mobile than younger workers (Abe, Higushi, Kuhn, Nakamura and Sweetman, 2002). This suggests that population aging may impede the ability of the Canadian economy to adjust to structural changes or may increase the costs of such adjustments.

Because older people consume different goods and services (e.g. housing and health care) than younger individuals, a rise in the proportion of the older people in the population may also lead to final demand changes (Börsch-Supan, 2001). Such a change in the consumption mix may significantly impact the sectoral composition of production and may consequently necessitate a shift of workers between industries. However, as these changes are likely to be gradual and predictable, they may not be too serious and costly (Kuhn, SRI-2003).

3. Population Aging, Productivity and Growth in Living Standards

Predicting how population and workforce aging will affect labour markets and the availability of skills requires modelling the intertwined dynamics of the economy, the labour market and individuals' skill investment decisions. Results from models show that population aging may lead to a slowdown in growth of living standards and may have significant regional, sectoral and occupational impacts.

Economic models have become increasingly sophisticated, allowing policy analysts to explore the various consequences of changes in the characteristics of the population on the economy and the labour market. One such model is the latest version of Models of the Economic Demographic System (MEDS) developed by Denton, Feaver and Spencer (SRI-2006) for the SRI. Assuming different scenarios, the authors present a series of demographic projections where trends in labour force participation are estimated along with the impact of population aging on productive capacity until 2051.

In the “base case scenario”, the total fertility rate, immigration, emigration and intensity of work remain at their current levels, while life expectancy, participation rates, educational attainment in the population and productivity are allowed to change following recent trends. The annual total factor productivity growth is assumed to be 0.5%.

- Between 2001 and 2021, according to this scenario, the population would grow by 17% and the labour force by 18%. The proportion of individuals under 15 years of age would decrease from 19% to 14%, while the proportion of individuals 65 and older would increase from 13% to 27%. Real Gross Domestic Product (GDP) and real GDP per capita are projected to increase by 70% (2.7% average annual growth) and 44% (1.9% average annual growth), respectively.
- Over the longer term, the model predicts that population aging significantly reduces growth in productive capacity. Between 2021 and 2051, real GDP and real GDP per capita are projected to grow respectively by 45% and 35% (i.e. 1.2% and 1% per year on average). In 2051, the size of the population will be only 7% larger than in 2021 while the labour force will be 2% smaller.

The authors also present several alternative scenarios where fertility, immigration, labour force participation, education and productivity are assumed to be either lower or higher than in the base case. These assumptions are examined separately as well as simultaneously. Although these projections were performed for illustrative purposes, they provide some interesting findings for policy.

- Increasing the participation rate of individuals 65 and older by 10% (which could simulate the elimination of mandatory retirement) would have a negligible impact, raising projected real GDP in 2051 by less than 0.5% compared with the base scenario (annual growth rate would remain virtually the same).

- Higher fertility (assuming the birth rate reaches the replacement rate by 2012 and remains constant thereafter) would have little impact on the labour force and GDP by 2021. By 2051, the labour force would be 17% larger and the GDP 10% higher, but GDP per capita would be 8% lower.
- Increasing the number of immigrants by 50,000 per year in 2005 and after would result in a GDP that is about 7% higher in 2051, but GDP per capita would rise by less than 1%.
- Gradually raising labour force participation rates for men between ages 20 and 64 (restoring the 1976 levels by 2016) and raising rates for women so that the gender gap is unchanged would result in a GDP higher by 7% in 2051 (with an average annual growth of 1.3% over 2021 to 2051). The projected increase in GDP per capita is of the same magnitude. Similar results would be achieved in 2051 by accelerating the rate of change in the educational attainment of 15- to 34-year-olds.¹
- Productivity is an important driver of GDP. Doubling the annual total factor productivity growth rate to 1% (from the 0.5% assumed in the base case) would result in a GDP that is about 33% higher in 2051 than in the base case scenario, with an average annual growth rate of 1.9% instead of 1.2% over 2021 to 2051.

Computable general equilibrium (CGE) models take into account the economy-wide effects of changes like population aging and the interactions of these effects. Using a CGE model, Fougère, Harvey, Mercenier and Mérette. (SRI-2005a) estimate that:

- Population aging will lead to a drop in real GDP per capita of more than 11% by 2050, relative to the level if population aging had not occurred.
- Over the next 10 years or so (until 2014), however, the impact on real GDP could be positive due to the effect of a more experienced and skilled labour force.

The intensity and speed of the upcoming demographic change will differ markedly across the Canadian regions. Fougère et al. (SRI-2005b) find that regional differences in fertility rates, international/interregional migration, participation rates and retirement decisions will lead to a substantial increase in regional income disparity across Canada.

- Eastern Canada and Quebec are likely to face much tighter labour supply constraints, leading to slower growth in productive capacity than the rest of Canada. Some provinces like Ontario will be little affected by population aging.
- Since immigrants tend to settle in some regions more than in others, regional disparities could amplify if recent trends in immigrants' location continue.

Besides slower labour force growth, population aging will likely trigger changes in the demand of goods and services because of the specific needs and preferences of older consumers. The impacts of population aging could thus be different across industrial sectors

¹ Under the scenario assuming an accelerated rate of change in educational attainment, the share of the population aged 15 and over with university education is projected to be 42.7% in 2051, compared with 31.4% under the base scenario.

and occupations. Mercenier, Mérette and Fougère (SRI-2005) investigate these differential impacts with a sectoral CGE model.

- Compared to 2000, the share of the health sector in total GDP would be nearly 50% higher in 2050.
- Sectors like finance and insurance would also increase their share, but not as much as the health sector. Other sectors like manufacturing, construction, education and retailing would experience a reduction of their share.

The results of Mercenier et al. (SRI-2005) also suggest that, despite changes in the relative importance of industrial sectors, wage pressures due to slower labour force growth will keep relative wage increases very similar across sectors.

- Real wages will increase across all occupations and skill levels, but some differences will appear over the long run.
- Wages in health occupations are projected to be 17% higher by 2040 and 2050, an increase nearly twice that projected for occupations in manufacturing, trades and transport.

Fougère et al. (SRI-2005a) examine the potential impacts of alternative scenarios regarding immigration policy:

- Immigration could lead to only small economic gains if immigrants are not well targeted. Attracting a large proportion of immigrants with a weak attachment to the labour market and low productivity may reduce growth and lead to a deterioration in the fiscal balance.
- Raising the proportion of highly skilled immigrants by 0.25% of the population could offset the expected negative impact of aging on growth in productive capacity by almost half.
- These positive impacts of highly skilled immigration assume that immigrants with a given credential can easily replace a worker with the same credential who was trained in Canada.

Recent experience suggests that it is not always the case that immigrants with a given level of educational credential can be readily substituted for Canadian-born persons with the same credential. Recently published results from the International Adult Literacy and Skills Survey show that immigrant workers with a university degree are far more likely to have low levels of English or French literacy skills than Canadian-born workers with a university degree. (See Coulombe and Tremblay, SRI2006). Immigrants' training abroad may not correspond exactly to Canadian training, requiring costly mechanisms of retraining or of credentials recognition.

One potential downside of targeting highly skilled immigrants is that raising the supply of skilled workers in the economy could reduce the skill premium and the return to investment in education, potentially leading to lower levels of skill investment by Canadian youth.²

These research findings raise policy issues:

- *Maintaining current rates of growth of standards of living after 2021 will be extremely difficult. It would require increases in the rate of productivity growth, in labour force participation rates of older workers, or both. For example, an increase in trend productivity growth in Canada from 1.7% to 2.1% a year would completely offset the effects of population aging on GDP per capita. Can these increases be attained and how? Can it be by policies to reduce the effective cost of capital in Canada? How much can increased skills investment by Canadians contribute? To what extent will decreased availability of labour due to population aging lead firms to make productivity-enhancing investments?*
- *Effects of population aging will vary by region, with Quebec and eastern Canada experiencing greater difficulties in maintaining growth in standards of living, due to more rapid population aging. To what extent will these regional differences increase pressures for interregional transfers?*
- *The principal sectoral and occupational effects of population aging will occur in the health sector, where increased demand for health services will lead to increased employment and increased relative earnings in health sector occupations. If governments attempt to restrict income and employment growth in health care occupations for budgetary reasons, what will be the results for the availability of skilled health care workers? Since health is a critical factor in retirement decisions, how will health care policy affect the labour force participation of older workers?*
- *The results above show that immigration is not a magic cure to the issues posed by population aging. Skilled immigration has the greatest positive impact, but only if the immigrants' skills are equivalent to those of workers trained in Canada and are recognized to be equivalent by employers. Recent experience suggests that skilled immigrants may need costly skills upgrading and credentials assessment to be able to work in their fields of training in Canada. Also, the research suggests that increases in skilled immigration might decrease incentives for skill investment by Canadians. What should be the balance between increased educational and skills investment for Canadian youth and workers and investment in recruiting and integrating skilled immigrants? Will it be increasingly difficult to recruit skilled immigrants, as demand from other advanced economies increases and economic conditions for skilled labour improve in source countries?*

² This result is also supported by Borjas (2005), who found that an immigration-induced increase in the supply of doctorates in the United States significantly reduces the wage of competing workers.

- *The results also suggest that, if current patterns of immigrant location persist, increased skilled immigration could worsen regional disparities. To what extent should policy seek to influence immigrants' choice of where to locate, if the result is a decrease in the contribution of skilled immigrants to increasing Canadian productivity?*
- *Substantial changes can be expected in the global economy that could have an impact on how individual countries experience population aging. What conditions could mitigate projected wage pressures in the Canadian labour market and how would different groups of workers be affected?*

4. Labour Force Participation of Older Workers: Challenges and Opportunities

Although Canadians are living longer, there has been a trend to earlier retirement since the 1980s. Can removing barriers to continued work and changes in employer practices affect the trend to earlier retirement?

The average age of retirement was near 65 years during the 1970s and early 1980s and declined more or less steadily during the mid-1980s and 1990s, reaching 60.9 years in 1998; it has increased slightly since then. The trend toward early retirement is also noticeable in the labour force participation rate of older workers. The evidence of early retirement is clearest among the 60 to 64 age group, where the participation rate for men declined by about 17 percentage points between 1976 and 1982, and 1997 and 2003, while the participation rate for women increased by 2.8 percentage points over the same period. Finally, the participation rate for both men and women aged 65 years and older has declined over the past 25 years.

Early retirement behaviour raises important public policy challenges as it implies reduced labour supply and output. Moreover, since population aging means more people in the older age groups, the negative effects on labour supply due to early retirement will intensify. Fougère et al. (SRI-2005b) use a CGE model to examine the potential economic and labour market effects of working longer in Canada. They found that in the long run, the impact of working longer could be substantial in terms of extra labour supply and real output. First, the marginal effect of working one extra year would lead to a 3.5% increase in real GDP per capita by 2050. Second, a gradual increase in the effective age of retirement to reach 65 by 2015 would raise real GDP per capita by nearly 12% in 2050.

Thus, if Canadians worked longer, this would result in a substantial increase in their living standards. What policy instruments might facilitate Canadians' choosing to remain at work? Research carried out for the SRI has investigated the impact of Canada's public pensions on the retirement decision of individuals and the various reasons for retiring voluntarily or involuntarily. SRI research also examined the implications of changes in the age structure and of workforce aging on labour market institutions and internal human resources

management practices of firms, and the consequences for continued participation by older workers.

The public retirement income system may affect a person's retirement decision through wealth effects and accrual effects. A wealth effect exists when public pensions increase a person's total lifetime income, leading the person to retire at an earlier age. Conversely, an accrual effect exists if the discounted present value of future pension income depends on the date of retirement. For example, if working an additional year decreases the discounted value of future pension benefits, a worker will have a strong incentive to retire now.

Milligan and Schirle (SRI-2006) examine how each of the four components³ of the Canadian public retirement income system contributes to both wealth and accrual effects. They calculated income from each component for a "typical" individual and then compared differences in the incentives when private pension income, lifetime earnings and continuity of lifetime earnings vary.

Their analysis shows that the Canadian retirement income system provides work disincentives, although they are small when compared with other industrialized countries. If each component taken separately influences the decision to retire to some extent, it is the interactions between them that provide some of the strongest incentives to retire.

- An individual whose only income source is the public retirement income system faces some incentives to work up to age 60, but then faces disincentives to work, which become even stronger at age 65.
- Although work after age 60 leads to higher CPP/QPP pension through actuarial adjustment, each dollar of extra CPP/QPP income will lead (for those entitled to GIS) to a decrease of 50 cents in GIS income after age 65.

Given that GIS recipients represent the bottom third of the income distribution among individuals aged 65 and over, it appears that disincentives to work are strongest among low-income (and presumably low-skill) Canadian seniors, probably those who would benefit the most from working extra years to increase their retirement income.

Milligan and Schirle also present simulations showing that the magnitude of work disincentives in the public system is sensitive to system parameters. However, removing work disincentives from this system may not be enough to significantly boost the labour force participation of older workers. Moreover, these work disincentives have to be balanced with the fact that the public retirement income system contributes to the reduction of poverty by providing to low-income seniors a significant portion of their retirement income. Public policy would therefore need to consider other policy options that may possibly involve employers and labour market institutions.

Private pension plans also play a decisive role in the decision to retire. Employers can use features of their registered pension plans (RPPs) to encourage older workers to retire or, on the contrary, to retain them if they desire to do so. Gomez and Gunderson (SRI-2006a)

³ Canada Pension Plan/Quebec Pension Plan (CPP/QPP), Old Age Security (OAS), Guaranteed Income Supplement (GIS), and the Spouse's Allowance.

suggest that employers could cut back on certain RPP early retirement incentives. Moreover, employers could reduce the disincentives for those who postpone retirement. For example, RPPs may not actuarially adjust the pension benefits for those who remain past a certain age or a certain number of years of service. That being said, there may be limitations to what can be done to increase labour force participation of older workers through changes in RPPs.

Gomez and Gunderson (SRI-2006b) examine the near-to-long-term implications of changes in the age structure on workplace human resource practices. In their view, older workers are more likely to be well suited for their jobs in terms of skills and usually require less supervision. Compared with prime-age workers with family responsibilities, older workers, especially those aged 65 and over, are also less likely to look for a permanent job (if not holding one), and they are more likely to choose non-standard employment (e.g. part-time work, self-employment, working at home).

Employers will need to adjust the way they manage their human resources, notably how they recruit and retain workers. More specifically, they may have to review their traditional seniority -based systems of promotion. When older workers represent a large part of the workforce, seniority-based systems of pay and promotion may become less desirable. However, given that workers are usually more reluctant about a system based only on performance and merit, employers should be careful when introducing such systems.

Flexible work arrangements could be the most promising way to retain older workers or to incite retirees to re-enter the labour market. According to Gomez and Gunderson (2006a), “the most important barriers that inhibited retirees from continuing in employment had to do with wanting to reduce their work-time through such arrangements as part-time work, fewer days per week, shorter days and longer vacations.”

However, some features of public policies and programs may discourage such flexible work arrangements. Because of payroll tax ceilings, for example, offering shorter work hours or shorter work weeks to employees is more costly for employers.

In terms of labour market institutions, Gomez and Gunderson (SRI-2006a, b) argue that the elimination of mandatory retirement and age discrimination through legislation would obviously help employers to retain older workers. In jurisdictions that still have an age cap in their Human Rights Codes, the elimination of the age cap would ban mandatory retirement unless it was allowed in specific cases. When mandatory retirement is still allowed in a jurisdiction, its voluntary elimination may be an option to consider (although this may have to be negotiated with unions if present). Elimination of mandatory retirement can be a voluntary solution designed to respond to specific firm needs. For instance, firms might be more likely to eliminate mandatory retirement when they foresee skill shortages. Based on the 2002 General Social Survey, Gomez and Gunderson (SRI-2006a) reported that only 10.5% of individuals would have continued in employment if there were no mandatory retirement policy. Although removing mandatory retirement would affect only a small number of older workers today, Gunderson and Gomez argue that the numbers will become larger, because future cohorts of older workers are likely to wish to remain longer in the labour force.

Most of the policy options to remove work disincentives or retain older workers discussed above may increase the flexibility in the labour market and support the participation of older workers who wish to work longer. The effects of these policy changes are difficult to quantify but they generally target a small proportion of workers. Demographic pressures are so powerful that these policy changes would likely not be enough to offset the expected decline in labour force growth, but they would help. And in any case, the strongest influence to increase the labour force participation of older workers will likely be from increased wages due to the increased relative scarcity of labour.

These research findings raise policy issues:

- *There is potential for increased labour force participation by older workers in Canada, as participation rates for this group are lower than in some other OECD countries. Should policy aim to increase older workers' labour force participation, or to remove barriers to their continued participation? The policy measures discussed here seek to remove barriers to participation, without adopting of increased participation by older workers as a policy objective.*
- *The Canadian public retirement system provides incentives to early retirement and disincentives to work after age 65. The strongest work disincentive effects are due to the clawback of the GIS (and the interaction of the GIS clawback and CPP/QPP benefits) which primarily affects low-income individuals. Should ways to reduce this work disincentive be considered (e.g. by exempting earned income from the clawback)?*
- *Recipients of the GIS come predominantly from low-skill groups. The work disincentives for high-skill workers from the public retirement system are small. Are there approaches such as flexible arrangements that might lead highly skilled workers to prolong their labour force participation?*
- *Employers have used early retirement offers to facilitate workforce reductions, leading in many instances to labour force withdrawal. Also, RPPs often have significant disincentives to continuing to work for the employer after age 65. Potentially, RPPs could be restructured so as to provide incentives to prolonged workforce participation. Should public policy seek to encourage the restructuring of RPPs to promote increased labour force participation by older workers? What changes might have this effect?*
- *Employers may need to make significant organizational changes to retain and recruit older workers, including increased provision for part-time or part-year work. Should policy aim at supporting organizational change to accommodate an aging workforce, and if so, what should be the priority areas for policy action?*

5. Population Aging, Skills Development and Human Capital

Skills vary with age; some are preserved or improved, others decline or depreciate. Younger workers have higher skills investment than older workers. What are the likely consequences of a higher proportion of older workers for the level of skills and the propensity to train? Will an older workforce have the ability and flexibility to make the adjustments required by a fast-paced knowledge-based economy?

The psychology and economics literature on skill acquisition and depreciation reviewed by Kuhn (SRI-2005) suggests that young and old workers differ in type and level of skills. Overall, performance in many mental tasks (e.g. tasks that require speed or processing lots of information) declines with age and this decline appears to have a biological basis, like the decline in physical performance. The rate of decline is not biologically predetermined, however, and varies according to characteristics like gender, health status and education. Verbal abilities and some “soft skills” like wisdom and leadership appear to be less correlated with age.

- Although the ability to acquire new knowledge may decline with age, older individuals have a stock of accumulated knowledge that keeps growing as long as some learning occurs.
- Older workers are also likely to have a better job-match quality, which is a factor contributing to productivity. Conversely, higher job-match quality and reliance on accumulated knowledge could imply that an older workforce is more vulnerable to trade or technology shocks.

However, Kuhn suggests that recent cohorts of older workers (healthier, better educated, with higher historical level of job insecurity) may already be less vulnerable to economic shocks than previous cohorts. He also suggests that the shorter time horizon of older workers may actually provide an opportunity for these workers to invest in the acquisition of “risky” skills.

This latter suggestion constitutes an original argument in favour of removing institutional barriers that might impede older workers to train either to remain or to return on the labour market. Older workers could be in a favourable position to respond to a sudden and possibly transitory demand for specific knowledge or skills, because they could be the ones who have less to lose in meeting this demand.

Much remains to be known about the skills involved in the innovation process, in particular, about their relation to age. The dissemination, adoption and adaptation of new technologies and commercialization of new products and services are important parts of the innovation process. Experience is a key element in these aspects of innovation, and older workers could have a significant role to play because of their greater experience. Although younger workers may have an advantage in the invention phase of innovation, older workers can nonetheless contribute significantly because this phase often involves teamwork, which is one of their strengths.

Like skills and abilities, an individual's productivity is also generally thought to be affected by age, raising concerns about the potential costs attributable to an older workforce. This is partly based on studies indicating that older workers have higher than average salaries that cannot be explained by higher productivity. Therefore, older workers would cost more to employers than what they could produce. However, other studies do not support these conclusions.

Using Statistics Canada's Workplace and Employee Survey (WES), Dostie (SRI-2006) examines wages and productivity⁴ differentials across three age groups (under 35 years; 35 to less than 55 years; 55 years and older). Aggregated results show that both wages and productivity reach a maximum in the middle-aged group (35 to 55 years) and decline thereafter. When age groups are further distinguished by gender and education, however, the picture is mixed. For women and men with less than a university education there is no significant decline in productivity for the 55 years and older age group. For women and men with a university education, productivity declines for the 55+ age group; while the men's salary does not decrease and the women's salary decreases by less than the decline in their productivity. Because of the limitations of the available data, some caution should be exercised in drawing conclusions.

- Dostie's results indicate that workforce aging may have some impact on the productivity of Canadian firms due to the decreased productivity of older workers with a university degree.

The expected return to education is usually regarded as an important factor in the decision to acquire more education or to train. In the context of slower labour force growth, more scarce human resources and increased demand for highly skilled workers, the wage premium associated with higher education is likely to go up. Could this encourage young cohorts to invest more in human capital formation, thus contributing to offsetting to some extent the decline in labour force growth and its anticipated effects on productivity?

Using a CGE model, Fougère et al. (SRI-2006) examine how population aging could affect the way in which individuals allocate their time between education, work and leisure, and in turn, how these time allocation decisions could affect the economy over the next decades.

- Their results indicate that the time allocation decisions of current and future young cohorts will change gradually, with a substantial increase in the time allocated to education at young ages and a corresponding reduction in the time allocated to work by youth.⁵

⁴ Employees' productivity is evaluated from the estimated production function of firms where the capital stock is imputed based on an industry average.

⁵ For high-skilled individuals, time spent in education by those 17 to 20 years of age is projected to increase over 2002 to 2038 and then decline, while time spent in education by those 21 to 24 years of age is projected to increase over 2010 to 2050.

This reduction in labour supply of young individuals initially lowers the productive capacity of the Canadian economy and exacerbates the impact of population aging. At middle age, however, these more educated cohorts allocate more time to work than the previous ones and also work longer.

- In the longer run (30 years or so), the initial investments in education would contribute to raising productive capacity through increases in the supply of skilled workers and to lowering the economic cost of population aging.

Governments may have an important role in promoting participation in education, since in the absence of adequate information, youth may not be aware that the returns to education are likely to increase.

However, promoting participation in higher education may not be enough and higher wage premiums may not translate into an increased proportion of youth who enrol in higher education. Other factors, according to Fortin and Lemieux (SRI-2006), can play a decisive role in these decisions. Using Census data from 1981 to 2001, they show that the return to university education increased for men between 1995 and 2000. Provided that the demand for university-educated men in the labour market keeps growing at the same rate observed between 1980 and 2000, they also project an increase in the rate of return to university education over the next 10 to 20 years. The rate of return to university education for women was higher than for men in the past and is projected to remain relatively constant.

Fortin and Lemieux also found that the wage premium associated with university education was not a significant determinant of university enrolment rates between 1980 and 2000. Rather, the enrolment rate was influenced by the size of university-age cohorts and education policies (i.e. funding of higher education institutions and tuition fees).

According to the authors, these factors explain why educational achievement of the largest baby boom cohorts stagnated compared with previous cohorts. Even if more young people were willing to take advantage of the increasing returns to university education, the enrolment rate is unlikely to increase unless the education system increases its capacity to absorb them.

Thus, important and sustained investments would be required to enable an increasingly large proportion of young people to obtain a university education.⁶ Investments to increase the capacity of the post-secondary education system should be combined with policies targeted at increasing the propensity of youth to enrol in higher education.

⁶ To sustain the relative growth in the supply of university-educated workers observed for cohorts born between 1916 and 1980 (a bold objective given the more modest recent trends), simulations indicate that the number of university “seats” would have to grow by 7,500 per year over 2000 to 2010 and by 10,000 per year over 2010 to 2020. Simulations also indicate that these targets could be attained with annual real increases of 2% of both tuition and funding levels.

These research findings raise policy issues:

- *How can skills policy and labour market policy take advantage of older workers' strengths in soft skills to improve Canada's innovation and productivity performance? What policy approaches might serve to increase skills in those areas related to innovation and productivity where older workers are weaker?*
- *Increased skills among youth who enter the labour market are an obvious possibility for how to improve skills related to innovation and productivity. Research results suggest that population aging will increase incentives for youth to invest in their human capital, but that higher levels of human capital investment also depend critically on the provision of classroom places. How and to what extent should policy seek to increase provision of post-secondary education? What levels of post-secondary education should be emphasized?*
- *Another possible source of skills is increased skills investment by persons already in the workforce. How and to what extent should policy support skills investment by persons already in the workforce? Should the emphasis be on participation in post-secondary education or on training in specific skills?*

6. Policy Implications and Conclusion

Population and workforce aging will deeply affect the Canadian economy in a wide range of areas. The public and policy makers have become aware of some of these (e.g. the impact on the financing of public pension plans and the impact on the demand for health care services). Less attention has been paid to certain other important impacts.

Among these are the challenges an aging population poses for Canada's ability to provide the skills needed to build an increasingly innovative and productive economy. This paper summarized the results of SRI research on this theme and examined the policy issues raised by these results.

The first line of research discussed in the paper involved modelling the impacts on labour markets of population aging and of possible policy responses to population aging. The results of this research underline the need to maintain or increase productivity growth if living standards are to continue to rise despite population and workforce aging. Further increases in skill levels of Canadian workers can make an important contribution to productivity growth and to increased standards of living. A series of policy issues related to maintaining and increasing skill investments is discussed below.

The effects of population aging will not be the same in all labour markets. Modelling results indicate that population aging will tend to increase regional disparities within Canada, with the most rapid population aging occurring in the poorer regions. This is likely to lead to increased pressure for interregional transfers.

In general, population aging is likely to lead to increased scarcity of labour, relative to capital, thus resulting in an increase in wage rates relative to the return on capital. The sectoral and occupational labour markets where wages are likely to increase most rapidly are

in the health sector, due to rising demand for health services. Moreover, the demand for health services will increase more rapidly in the poorer regions. These regions may find it increasingly difficult to compete for skilled workers, especially in health.

Immigration is often seen as a possible offset to population aging. Modelling results indicate that two conditions must be met for immigration to have a positive impact on standards of living. First, the immigrants must be highly qualified. Unskilled immigration will not increase the standard of living. Second, highly qualified immigrants must have the skills needed in Canadian labour markets. If immigrants lack language skills or if their skills are not well suited to the requirements of Canadian employers, even highly qualified immigrants may not contribute much to raising Canadian standards of living.

Increases in skilled immigration may tend to lower the return to skills investment by the Canadian-born, and consequently to decrease the supply of skills available from this group. Also, if current patterns of immigrants' choice of location persist, reliance on skilled immigration may increase regional disparities.

If individual Canadians—in particular, highly skilled Canadians—worked until later in life, it would have an important effect on standards of living as the population ages. Trends in labour force participation of older men have been toward earlier retirement in recent decades, although there has been a reversal in this trend in recent years.

Are there barriers to prolonged labour force participation that could be removed or lessened by policy initiatives? SRI research shows the strongest work disincentives in the public retirement system are for persons who receive or will receive the GIS. There is not likely to be many skilled workers in this group. Indeed, skilled workers are likely to have significant income from sources other than the public retirement system. Under these circumstances, the disincentives to continued labour force participation due to the public retirement income system are small.

Increased flexibility, allowing for part-time or part-year work, might be a useful approach to keeping older skilled workers attached to the labour force. As the cost of labour increases with population aging, employers are likely to adjust their employment practices to retain older workers.

There are barriers to increased flexibility that could be addressed by policy initiatives, including mandatory retirement, limitations on receiving pension income and employment income simultaneously from the same employer, and contributory plans that make it more expensive to hire part-time or part-year workers.

Will an older workforce be a less skilled, less productive, less innovative workforce? SRI research suggests that this will not be the case, although one study indicates a decline in the productivity of university-educated older workers. The composition of the skills available may change due to workforce aging. Research shows that certain physical and cognitive abilities decline with age. This is likely to be associated with an age-related decrease in the rate at which individuals acquire new skills, but older workers will have already accumulated a large stock of skills over their work life. Older workers may have relatively more soft skills and relatively less technical skills than younger workers, but both of these types of skills are important for innovation and for productivity growth.

With smaller cohorts of youth entering the labour market, relative to the size of the existing workforce, the level of skill investment by these youth will be an important determinant of the skills available to the Canadian economy. Increases in the levels of real wages due to aging will favour increased skill investment by these youth.

SRI research suggests, however, that the skill levels of new entrants depend critically on the capacity of the post-secondary educational system. Thus, post-secondary educational policy will play a crucial role in determining to what extent the increased skill levels of new-entry cohorts will compensate for their smaller relative size due to population aging.

Training of those cohorts already in the workforce is likely to become an increasingly important source of skills for the Canadian economy. An important role for governments is to support the development of the most relevant and efficient skills development strategies and training methods for an older workforce. Similarly, there is a role in promoting the adoption of such strategies and methods by institutions and employers. Factors affecting workers' and employers' decisions with respect to training are examined under another SRI research theme.

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